Weather Brew

NWS Milwaukee/Sullivan

Fall/Winter 2009

Volume 1, Issue 2

Sullivan's "Fantastic Five"

You'll find all sorts of superhero teams out there who protect the life and property of the American people. The Dynamic Duo, X-Men, and Fantastic Four are just a few of the teams that come to mind. Oh yeah, and who could forget Mr. T and the A-Team from that TV show in the 1980's. Although these characters are fictional, rest assured, there is a different kind of team right here in southern Wisconsin doing their part to protect the American people.

Electronics technicians Travis Unkel (lower left) and Chris Kornkven work on the NWS WSR-88D radar in Sullivan, WI (MKX).

It's just after 8 o'clock on a steamy June evening. Most folks in Wisconsin have settled in for the night, while others prepare for a night out on the town. Meanwhile, a large complex of thunderstorms gathers strength in eastern Iowa. The meteorologists at MKX in Sullivan, WI are well aware of the developing situation. A Tornado Watch has been posted until 2 AM for the possibility of some very dangerous weather.

The lead forecaster in charge calls in extra staff to prepare for what looks to be an extremely busy evening. A forecaster motions to his screen and comments on how the environment is highly supportive of tornadoes. All of a sudden, a large, red banner is displayed on all five workstations. It reads, "Not receiving radar products from KMKX".

A couple forecasters shuffle over to the computer that monitors the status of our local radar. Sure enough, the screen is full of alarms, and we are no longer receiving data from our own radar. With severe weather moving in from the west, this is the worst time for our most valued tool for examining thunderstorms to be out of commission.

This was certainly a problem, but there was no reason to panic. With one phone call to our electronics staff, we soon had skilled technicians on site working through the problem.

(continued on Page 2)

Inside this issue:

Fantastic Five Cont.

Within the hour, our electronics team had identified the problem and restored communications to our radar. With our radar back, the forecasters were much better equipped to issue tornado warnings for the incoming storms.

Below are the members of Sullivan's own Fantastic Five (the electronics and support staff at the NWS in Milwaukee/Sullivan). All of these individuals provide invaluable support to our office and keep our day-to-day operations going. We asked each of them the following questions:

Where are you from originally?
When did you arrive at MKX?
What was your previous job?
What's the best part about working at MKX?

Kathy Elliott - Administrative Support Assistant (ASA)

(Kathy and her great nephew Hudson)

*Born in Lombard, IL (western suburb of Chicago...don't worry still a Packers fan)

*Arrived in September 2007

*Publication and Forms Manager for the 440th Airlift Wing, Air Force

* "The camaraderie here is wonderful; the Sullivan office is a top notch office. I'm very proud to be a part of it and welcome the challenge."

Duties: Responsible for payroll, budget and finance, travel, property, candy dish stocking, and records management.

Chris Kornkven - *Electronic Technician (ET)*

*Grew up in Bottineau, North Dakota

*Arrived in April 1996

*ASOS Technician for the NWS in Norman, OK

* "Supporting the NWS mission."

Duties: Performs field maintenance technical services and related support for a wide range of complex electronic, electro-mechanical, communications equipment, and standalone and networked computer systems.

Travis Unkel - *Electronic Technician (ET)*

*Born in St. Paul, NE

*Arrived in April 2007

*Ground Radar Systems Technician in the US Air Force

* "Being able to work on equipment that supports the mission of the NWS."

Duties: Performs field maintenance technical services and related support for a wide range of complex electronic, electro-mechanical, communications equipment, and standalone and networked computer systems.

Curt Backlund - *Electronic System Administrator (ESA)*

*Born in St. Paul, MN, raised in south Florida.

*Arrived in October 2001

*Started as an ET with the National Hurricane Center, hired as an ESA in Gaylord, MI

* "I enjoy the ability to work on a variety of equipment and computer systems. The NWS is a great organization that cares and takes care of its employees."

Duties: Serves as the site's lead technical focal point for maintenance on all electronic systems and equipment for local and remote areas. Serves as the supervisor for the MKX ETs.

Jerry Wiedenfeld - *Information Technology Officer (ITO)*

*Grew up in Edgerton, WI

*Arrived in January 2009

*Worked at NOAA's Meteorological Development Laboratory as a research meteorologist

* "While working here, I have enjoyed the day to day weather discussions, along with the strong sense of camaraderie."

Duties: Analyzes work concerned with integrated systems of computer programs and computer equipment. Supports meteorologists by developing or designing applications for computers.

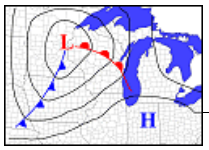
Student Volunteer Opportunities

The Milwaukee/Sullivan National Weather Service office provides an opportunity for college students to get some real-world experience in a forecast office. The opportunity is most commonly for freshman and sophomore meteorology majors. Students typically work one day per week during the summertime for an 8 hour day.

The volunteer program allows students to become familiar with the operations of the National Weather Service. Students will work closely with the Warning Coordination Meteorologist on various projects. Some common projects have been: working with and analyzing past storm data information, writing news stories for the MKX website and updating other data. During active severe weather days, an effort is made to include the student as much as possible in the operations.

Due to the number of interested students, an application process is used to select students for the program. An announcement will be posted on our website in late 2009 or early 2010 with more information and the application. Students do not need to be from southern Wisconsin to volunteer at our office. Any student who will be in the area and is able to commute to Sullivan about once a week is welcome to apply.

One-day job shadow opportunities are also available for high school and college students with a strong interest in a future career in meteorology. For more information on student volunteer or job shadow opportunities, visit: http://www.crh.noaa.gov/mkx/?n=student-information.



Improve Your Weather Knowledge

How To Accurately Measure Snow

Measuring snowfall and snow depth have traditionally been one of the more difficult parts of taking accurate weather readings and measurements. This is primarily due to the variety of conditions responsible for developing the snow in the first place. Most frequently, a heavy snow event is associated with a strong low pressure center that passes south of the state of Wisconsin. Either during, or right after this system, northwesterly winds will often increase significantly. This can lead to significant blowing and drifting of the recently fallen snow, leaving some spots in your yard bare and other spots with drifts of several feet.

To obtain the most accurate snowfall or snow depth measurement, a representative average must be taken over the entire measuring area. This means you need to take several, preferably 8 to 10, different measurements in an open area away from obstructions. You then average these measurements to determine the depth of snow. It is important that snow measurements are not taken in close proximity to trees or the edge of buildings where these obstructions could enhance or block the snowfall.

What Does The Wind Chill Value Really Mean?

The wind chill index takes into account air motion and the cooling rate of skin on the human body. As wind speed increases at a constant temperature, air is moved more quickly over the skin allowing more heat to be transferred from the skin into the surrounding air. In turn, the skin gets colder faster, and the wind chill index is lower. Likewise, colder temperatures at a constant wind speed also leads to a lower wind chill. The table below shows the wind chill value associated with certain temperatures and wind speed. The chart also indicates how quickly skin on the human body will develop frostbite in open air.

Temperature (°F)

Wind (mph)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Bridging the Gap Between Operations and Research

For the last several years, the Cooperative Institute for Meteorological Satellite Studies (CIMSS) and the NWS in Sullivan have been involved in a mutually beneficial relationship.

CIMSS is a Cooperative Institute formed through a Memorandum of Understanding between the University of Wisconsin-Madison (UW-Madison), the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA).

Lead forecasters Steve Hentz and Mark Gehring view MODIS satellite imagery

CIMSS operates as an institute within the Space Science and Engineering Center (SSEC). Dozens of CIMSS scientists conduct research on using remote sensing systems for meteorological applications. The research conducted here expands our understanding of remote sensing and its application to weather and forecasting, hydrology and climate.

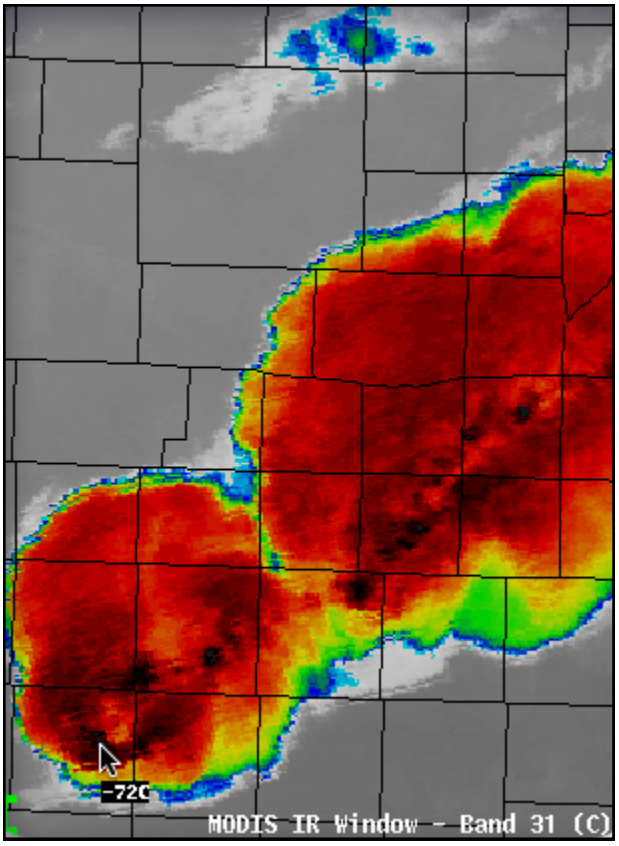
Beginning in the Summer and Fall 2006, CIMSS staff members began making frequent trips to the our office to install various satellite and model products on our local system. We have the ability to view a wide array of observational data and model output. This system is at the center of our forecasting and warning process.

The interaction has been mutually beneficial, because we at MKX now have several useful products at our disposal, and the researchers at CIMSS get a chance to see their research put to use in an operational setting.

Here are a few the products CIMSS has made available to our office:

- Moderate Resolution Imaging Spectroradiometer (MODIS, ex. Complex of thunderstorms seen below)
- CIMSS Regional Assimilation System (CRAS)
- GOES Sounder Imagery
- GOES Mesoscale Winds
- CIMSS Convective Development Nearcasting Model

We hope to continue this working partnership for years to come. For information on CIMSS or the products above visit: http://cimss.ssec.wisc.edu/.



(Courtesy Scott Bachmeier, CIMSS)

New Aviation Weather Products Webpage

When you click on the Aviation Weather link on the left menu of our homepage, you will find a new website with aviation weather products and information: http://www.crh.noaa.gov/mkx/?n=aviation.

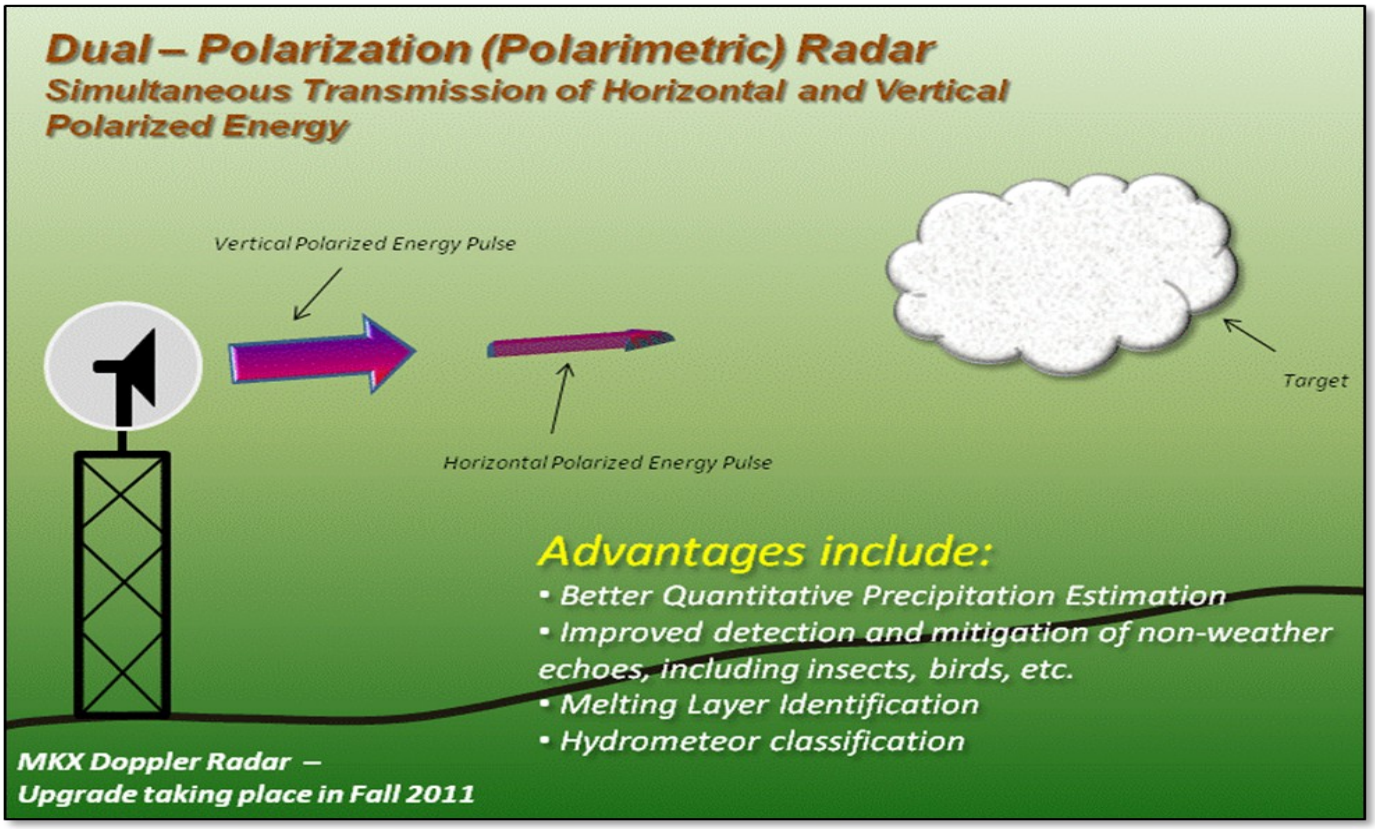
Terminal Aerodrome Forecasts (TAFs) and aviation weather discussions issued by meteorologists at the NWS Sullivan office, the Aviation Weather Center website and links to a few key products, as well as other useful links are all available from the new aviation weather website link. One useful link is the Tactical Decision Aid. This tool can be run for any TAF site in the United States. It allows you to view a TAF in a graphical format instead of the "encrypted" text TAF. Check out our new webpage and use it as a one stop shop for all your aviation weather needs.

Dual Polarization Radar Coming Down the Road

By Marc Kavinsky, Lead Forecaster

A significant upgrade will be performed on the existing National Weather Service Weather Surveillance Radar – 88 Doppler (WSR-88D) in Sullivan, Wisconsin in 2011. This upgrade will allow for **simultaneous transmission of horizontal and vertical polarized energy, called Dual Polarization**. This upgrade will also include modifications to the receivers as well as the shelter, tower, radome and dish.

The WSR-88D Doppler radar sends out short bursts of electromagnetic energy called pulses. These pulses bounce off particles in the atmosphere and a small portion of the energy is reflected back to the radar dish. A computer processes the returned signals and, through computer algorithms, can make conclusions about what kinds of particles the energy encountered, including the direction the particles were moving, and the speed of their movement.



The WSR-88D currently transmits horizontally polarized pulses, which give a measure of the horizontal dimension of the cloud (cloud, water, and cloud ice) and precipitation (snow, ice pellets, hail, and rain particles.)

Dual Polarization radars, also called polarimetric doppler radars, transmit electromagnetic energy pulses that have both horizontal and vertical orientations. The additional information from vertical pulses will result in improved estimates of rain and snow rates, better detection of large hail in summer thunderstorms, and improved identification of rain/snow transition regions in winter storms.

The National Severe Storms Laboratory conducted the Joint Polarization Experiment (JPOLE) in 2002-2003 to demonstrate the operational capabilities of the dual polarization radar. This experiment proved that significant improvements in rainfall estimation, precipitation classification, data quality, and weather hazard detection were likely with the upgrade to dual polarization.

The impacts of dual polarization radar could be as significant as the nationwide upgrade to Doppler radar in the 1980's, providing measureable benefits to meteorologists, hydrologists, aviation users and society.

New NOAA Satellite

In late June, a new Geostationary Operational Environmental Satellite (GOES), reached orbit and joined three other GOES spacecraft that help NOAA forecasters track life-threatening weather and solar storms.

GOES-14 is the second spacecraft in the GOES-N/O/P series and features significant improvements in the instruments that capture high-resolution pictures of weather patterns and atmospheric measurements.

NOAA has two operational GOES satellites hovering 22,300 miles above the equator: GOES-12, in the east, and GOES-11, in the west. Each satellite provides continuous observations of environmental conditions of North, Central and South America and surrounding oceans. While these two are operational, another GOES satellite, GOES-13, is in orbital storage and can be activated if one of the other satellites experiences trouble. (Info taken directly from NOAA website)

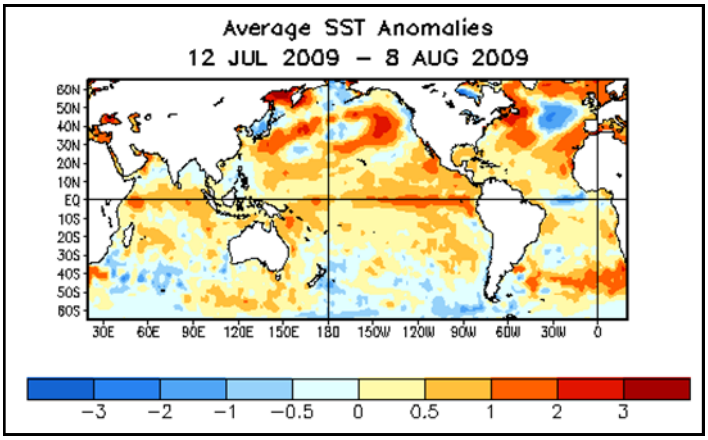
(Credit: NASA)

"Reliable satellite coverage helps us see severe weather as it develops." - Mary E. Kicza, administrator for NOAA's Satellite and Information Service

El Niño Arrives By Courtney Obergfell, SCEP

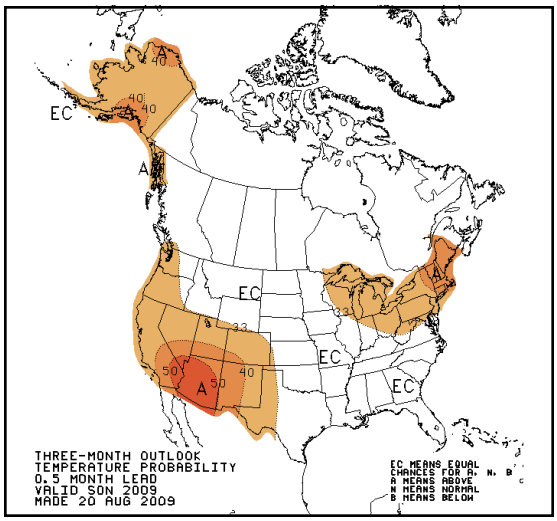
Recently, NOAA scientists announced the arrival of El Niño, a climate phenomenon defined by the periodic warming of central and eastern tropical Pacific waters. El Niño occurs on average every two to five years and typically lasts 12 months with influences on global weather, ocean conditions, and marine fisheries. NOAA expects this year's El Niño to continue strengthening during the next several months and to last through the winter of 2009-2010.

Normally, temperature and precipitation impacts over the United States are typically weak during the summer and early fall, but strengthen during the late fall and winter. Impacts depend on a variety of factors, but typically El Niño brings beneficial winter precipitation to the Southwest and less precipitation across the northern part of the country. El Niño can also help to suppress Atlantic hurricane activity by increasing the vertical wind shear over the tropical Atlantic Ocean and Caribbean Sea. NOAA's updated 2009 Atlantic Hurricane Season Outlook indicates a 90% chance of a near-normal or below normal hurricane season, which calls for 7-11 named storms, 3-6 hurricanes, and 1-2 major hurricanes. While El Niño can help suppress Atlantic hurricane activity, it can also produce damaging winter storms in California, increased storminess across the southern U.S., and severe flooding and mudslides in Central and South America.



What El Niño typically means for Wisconsin:

- Summers and Autumns tend to be cooler and wetter than normal. (Latest three-Month Temperature Outlook shown in figure below)
- Winters tend to be warmer and drier
- Less snowfall than normal
- Springs tend to be drier



Severe Weather Recap

The 2009 summer severe weather season was relatively quiet across Wisconsin. As of September 1, 12 tornadoes occurred across Wisconsin, while the average number of tornadoes each year is 21. Eight of these tornadoes were in the MKX County Warning Area in southern Wisconsin.

The following significant weather events occurred across the area:

- June 8: Several reports of wind and hail damage mostly south of I-94 and east of I-90. One tornado reported in the town of Mukwonago, Waukesha county (EF0).
- June 18-19: Several rounds of thunderstorms brought widespread severe weather and heavy rain. Hail greater than 2" diameter west of Madison, winds gusts to 70mph in far southeast Wisconsin, and 3+ inches of rain in parts of southern Wisconsin. Also two tornadoes were reported, near Highland in Iowa county (EF0) and near Somers in Kenosha county (EF0).
- June 23: A single thunderstorm cell produced a weak tornado near Milton in Rock County (EF0).
- July 23: Numerous hail reports came in from Racine and Kenosha counties of up to 1" diameter.
- July 24: Two thunderstorm cells brought wind and large hail up to 2.5" diameter (see article below) to southwestern Lafayette county. Two tornadoes were also confirmed in Lafayette county, near Shullsburg (EF1) and near New Diggins (EF1).
- July 27: Hail and wind damage reported across Iowa, Lafayette, Marquette and Green Lake counties. Two tornadoes, near Gratiat in Lafayette county (EF0) and from near Montello to near Dalton in Marquette and Green Lake counties.
- August 9: Widespread severe winds occurred across the southern two tiers of counties in Wisconsin. Significant wind damage was reported in southern Waukesha and Milwaukee counties, as well as across Racine county. Highest winds reported were 70 to 78mph.

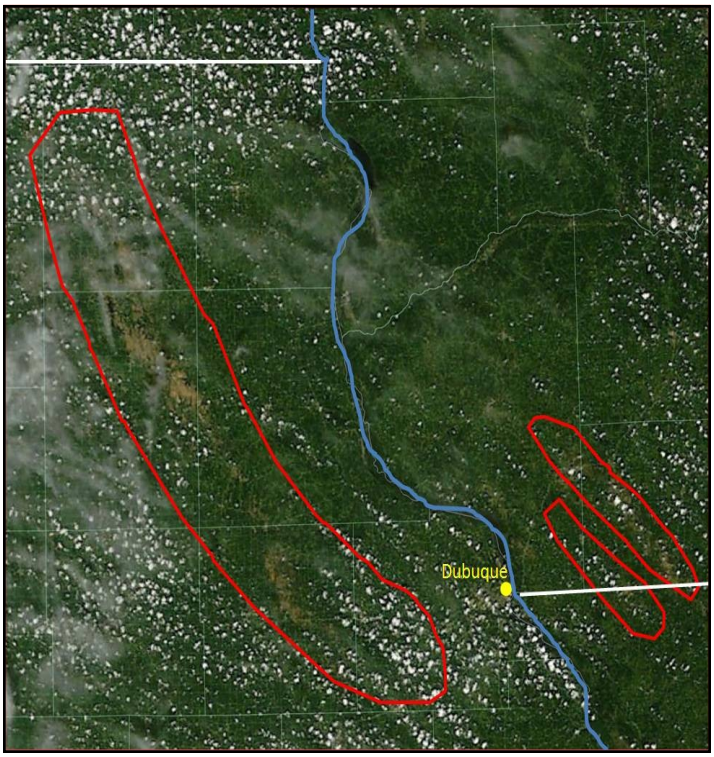
For additional information: www.weather.gov/mkx

Hail Scars on MODIS Satellite

Four separate storms across southwestern Wisconsin and northeastern Iowa dropped large hail on July 24. The two storms in northeast Iowa produced hail of tennis ball to grapefruit size, which is hail up to 4" in diameter! The storms in southwestern Wisconsin produced up to 1.75" hail in Grant County and 1.5" hail in Lafayette County.

The hail caused significant crop damage in both northeastern Iowa and southwestern Wisconsin. Corn fields were shredded, leading to a total loss of the crop.

Several days later, on a relatively clear day, a MODIS satellite map clearly showed the damage paths of these hail storms. Circled in red on this satellite image are areas where the storms tracked. The brown "scars" embedded in the green areas are where the hail has stripped the cornfields and other crops. Other satellite images also showed that these hail scars actually enhanced cumulus cloud development over these areas for several days following the event. The enhanced cumulus were caused by the stronger heating of the ground, now without fresh vegetation.



Fall Colors

Now that it's September, and given the cool summer, visions of pumpkins, changing leaves and turkeys are probably appearing in the minds of many Wisconsin residents.

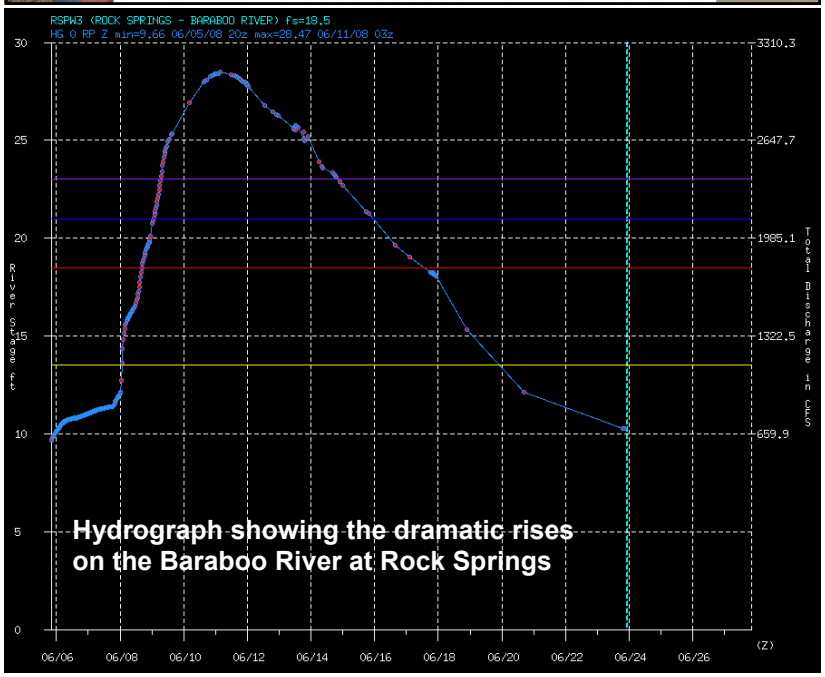
Due to it's large size, the timing of peak fall color varies from location to location in Wisconsin. Vegetation typically begins turning colors in northern Wisconsin near the end of September. The color peaks in early October in the north and then gradually heads south in the following weeks. Central Wisconsin sees the most color in mid October, while peak activity in the south usually goes from mid to late October. The exact dates are highly tied to weather, which even affect the amount of color. The cooler summer could mean earlier peak color.

(Credit: Travel Wisconsin)

So whether you're taking in the sites at Chequamegon-Nicolet National Forest, Door County, or right here in southern Wisconsin, sit back and enjoy Mother Nature's show.

High Water Marks From June 2008 Flooding

Lab Technician Jeff Borkenhagen and Plant Supervisor Greg Waterman hold the High Water Mark sign indicating the river level at the Reedsburg Waste Water Plant when the Baraboo River crested on June 10, 2008



Hydrograph showing the dramatic rises on the Baraboo River at Rock Springs

The first two weeks in June 2008 featured many days with rain, and a few days with exceptional rainfall across southern Wisconsin. The heavy rainfall produced flash flooding on several days and severe river flooding throughout the entire month of June.

Rainfall totals across southern Wisconsin during the first couple weeks in June ranged between 6 and 12 inches, with an isolated corridor of 12-16 inches from northern Sauk County into northwest Dodge County. According to the Midwest Regional Climate Center, precipitation amounts from June 1 to June 19 were over 400% of normal values across portions of southern Wisconsin. The exceptional amount of rainfall in a short period of time allowed for widespread flooding issues to develop.

Numerous rivers hit record levels during the first half of June. Twenty four locations reached record high levels, which represents over half of the 43 river gauges in the NWS Milwaukee/Sullivan hydrologic service area. Most of those that did not reach record levels had crests in the top five all time.

As a way of remembering these historic events, our office has posted or distributed "High Water Mark" signs at various locations in southern Wisconsin. Many of these signs are located on the river gauge shelters which reside near river banks. However, some signs will be positioned on the sides of other structures in various towns. Keep your eyes open for signs in these towns:

Afton	Baraboo	Beaver Dam
Fort Atkinson	Gays Mills	Jefferson
La Valle	La Farge	Lake Koshkonong
Readstown	Reedsburg	Rock Springs
Soldiers Grove	Steuben	Viola
Waupun	West Baraboo	White Creek
Windsor		

Winter Travel Preparedness

With winter fast approaching, it is important to be prepared for potential hazardous weather conditions through the winter months. It is important to have your car fully checked out and winterized. Keep your gas tank full to avoid ice in the tank or fuel lines. Also, be sure to carry a winter storm survival kit. Prepare the survival kit for the beginning of the winter season and keep it in your car so it is there when needed.

Items to include in the kit:

- Blankets/sleeping bags
- Flashlight with extra batteries
- First aid kit
- High calorie, non-perishable foods
- Extra clothing to keep dry
- Small can and matches to melt drinking water
- Sack of sand or cat litter
- Shovel
- Jumper cables
- Water Container
- Compass/road maps

If you do get stranded in your vehicle:

- Stay in your car
- Make sure exhaust pipe is not blocked
- Tie a colored cloth (preferably red) to your antenna
- Run your car for approximately 10 minutes every hour.

For more information visit:
http://www.nws.noaa.gov/om/brochures/wntrstm.htm

Rusty's Roundup

By Rusty Kapela, Warning Coordination Meteorologist

Is your community "***StormReady®***"?

Americans live in the most severe weather-prone country on Earth. Each year, Americans cope with the world's highest concentration of thunderstorms, floods, tornadoes, wild-fires, and other deadly weather impacts. Some 90% of all presidentially-declared disasters are weather related, leading to around 500 deaths per year and nearly $14 billion in damage. You can make sure your community or business is ready for the weather with the National Weather Service's *StormReady®* program.

StormReady®, a program started in 1999 in Tulsa, OK, helps arm America's community leaders and emergency managers with the communication and safety skills needed to save lives and property, before and during the event. Specifically, in order to become *StormReady®*, the community must:

- Establish a 24-hour warning point and emergency operations center
- Have multiple methods to receive and disseminate severe weather warnings and information for their community
- Have various methods to monitor weather conditions locally
- Promote the importance of public readiness via outreach educational activities
- Develop a formal hazardous weather action plan, including severe weather spotter training and drills

Through August 2009, communities in Wisconsin that have been designated *StormReady®* include the cities of Lake Mills, Whitewater, Cedarburg, Waupaca, Belleville, Viroqua, Dousman, and Hillsboro, along with the counties of Lincoln, Oneida, and Racine. Hortonville High School in Outagamie County, Weather Central, Inc./My Weather, LLC in Madison, and VCPI in Milwaukee are *StormReady® Supporters*. Several other Wisconsin cities and/or counties are currently working toward their *StormReady®* designation.

Information on the *StormReady®* program can be found on the national *StormReady®* web site at http://www.stormready.noaa.gov/, or contact Rusty at rusty.kapela@noaa.gov

Fisher & Porter Rain Gauge Rebuild

By Rudy Schaar, Data Acquisition Program Manager

Beginning this December, I will begin rebuilding the Fisher & Porter rain gauges replacing the paper punch drive and weighing mechanism. The new rain gauge is housed entirely within the body of the existing Fisher & Porter containment shell. Inside the access door, you will notice the precipitation recorder, a white and blue plastic box that contains a data logger. The new precipitation recorder takes the place of the mechanical punch tape assembly. A new weighing sensor replaces the current mechanical weighing spring assembly. This sensor consists of a metallic bar that bends with increased weight from the rain in the bucket. The weighing sensor is very sensitive and can detect changes of one hundredth of an inch of precipitation in a matter of several seconds. Readings from the sensor are processed by the precipitation recorder and recorded in 15 minute increments and stored electronically in the onboard data logger.

The precipitation recorder is pre-programmed to run automatically and has an LED monitor display with information such as the current rainfall total, date/time and calibration information. The monthly data is downloaded to a small memory (SD) card that the operator inserts into the unit after the beginning of the new month. The monthly precipitation information is automatically down loaded onto the memory card. The operator mails the memory card just as the paper tape is currently mailed to the Sullivan office. At Sullivan, the data is quality controlled and forwarded to the National Climatic Data Center for permanent archival. A new memory card is returned to the operator for the next month's data retrieval. The entire download process takes less than five minutes and should streamline the Fisher & Porter data retrieval process. The new rebuild should drastically reduce the lost data caused by numerous mechanical failures that plague the current system.

Comments and suggestions are always welcome. Your feedback is very important to us!

w-mkx.webmaster@noaa.gov

National Weather Service N3533 Hardscrabble Road Dousman, WI 53118

Newsletter Editors:

Chris Franks

Penny Zabel

Service Awards Presented

Ms. Donna Strum and Mr. Darwin Frye (above) from the Arlington Agriculture Research Center accept the **Honored Institution Award** for 50 years of continuous service in our COOP program.

Mr. Ray Sommers, Associate Director of the Animal Research Center of the UW School of Veterinary Medicine (Charmany Farm), accepts the **Honored Institution Award** for 50 years of service.

All of our COOP observers are instrumental in the daily operations of the NWS office, and we thank each of our more than 80 co-op observers in southern Wisconsin!